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sible by a different arrangement of the lignified parts. Here the external walls of the epidermal cells are composed of pure cellulose, while the internal and lateral walls are lignified; the external face of the cells, therefore, will contract more. The dehiscence of the sporangium of Ferns is characteristic and and unique. The different movements effected by the cells are due to the variation in pressure produced by the dryness of the air in the interior of the cells. The opening of the sporangium is therefore not due to the contraction proper of the cell-walls. In all three groups of vascular cryptogams the determining cause of the rupture is the same, viz: the dryness of the atmosphere.

In *Flora* for September 1st, J. Schrodt commences a paper on a similar subject, "Das Farnsporangium und die Anthere; Untersuchungen über die Ursachen des Oeffnens und Umrollens derselben."

PROF. WILLIAM TRELEASE has published, with plate, a resumé of his observations on several Zoogloeæ and related forms in the Johns Hopkins series of Biological Studies. The following note as to his method of culture is interesting to workers: "At first various starchy substances were employed as media for the growth of the different species, but I finally restricted my cultures to boiled potatoes carefully cut in halves, the exposed face being inoculated in one or more points by means of a needle scrupulously fired before and after each inoculation. These were kept in sauce-plates, under inverted tumblers, some of which were not disturbed until the end of the culture, while others were opened from time to time for microscopical study or for material to be used in starting new cultures. It is needless to say that many of these failed through the introduction of other germs in one way or another; but by means of frequent transfers, pure cultures of all ages were kept under daily observation for about three months:"

CURRENT LITERATURE.

Parasitic Fungi in Illinois: Part I, Uredineæ. From the Bulletin of the Illinois State Laboratory of Natural History, vol. II, pp. 139-255. By T. J. Burrill, Ph. D. Peoria, 1885.

The first striking feature of this work is its size, for although embracing but a single order as illustrated in one State only, it requires, exclusive of the preface, over one hundred and fifty octavo pages for the enumeration. Eighty-two true species and forty-seven imperfect forms are described. The recent catalogue of the parasitic fungi of Wisconsin gives sixty-five true species and thirty-four imperfect forms of Uredineæ, and that of Iowa gives seventy-nine true species and fifty-five imperfect forms. It is plain that the parasitic fungi are receiving marked attention, and the rusts in particular. Much credit for the size of the Illinois list is due Professor A. B. Seymour, now of the University of Wisconsin, who collected two seasons under the direction of the State Laboratory, and who has remarkably keen powers of observation.

Each species of the list is amply described, the localities for each host plant cited, some synonymy given and notes often appended. The whole is preceded by a key to the genera and followed by a glossary and index of species and host plants. The work throughout shows evidence of thorough and critical study, and is a very valuable contribution to American mycology. The labor on the synonymy is especially commendable. The author is cautious and yet judicious. He does not follow Dr. Winter in tracing back to æcidial or varietal names in case these occur, as introducing too great an element of uncertainty, but adopts the more conservative plan advocated by Dr. Farlow. There is much to be said in favor of this, and it will undoubtedly tend to give greater stability to our nomenclature for the present at least. The author also emphasizes the desirability of always writing the authority for the whole name, and not merely the authority for the specific part of it, as is now too common among many mycologists. The basis of the nomenclature used is summed up as follows: (1) the use of the oldest specific name known to have been used for the species as such, (2) the name of the teleutospore and uredospore stages are alone considered in the question of priority, and (3) the name of the author responsible for the specific appellation has been appended, being enclosed in parenthesis in case the generic association has been changed, and the name of the author of the binomial combination, whether the parts were adopted from others or not, finally follows. Out of the eighty-two true species, a dozen have their æcidial forms described along with the other stages.

An admirable plea is made for the more thorough investigation of the parasitic fungi as of great economic importance. This portion would be valuable and interesting reading to the majority of intelligent cultivators.

Physiological Botany: Part II. Vegetable Physiology. By George Lincoln Goodale, A. M., M. D., Professor of Botany in Harvard University. 8°. pp. 195-499; together with *Practical Exercises*, pp. 36. New York: Ivison, Blakeman, Taylor & Co. 1885.

Since the publication of the first part, the appearance of the concluding portion of this work has been eagerly looked for by the teachers and students of botany in this country. It will at once occur to the reader, as he lays down this volume, that here is a really new book; not new in its facts, of course, but essentially new in the arrangement, and thoroughly original in the presentation of them. On further consideration, he will be impressed with the very wide range of literature from which these facts have been gathered, and he will be thankful that the author has not been content with a mere mention of the name of the observer, but has given copious references to the literature, and in many cases a citation of the passage in point. This will certainly prove very helpful to teachers and their pupils alike—helpful to the former, because it will save the time otherwise spent in hunting up these scattered papers for more valuable work; and helpful to the latter, because it will impress upon them that there is much knowledge which could not be put into a five hundred page book.

The reader will also be impressed with the comprehensiveness of the treatment. One can hardly mention a topic in vegetable physiology which is not elaborated or touched upon. No one can look at the table of contents without noticing at once the number and variety of the topics and their very logical arrangement.

Of all the chapters in the book, perhaps the one on assimilation may be said to the most thorough and satisfactory. An excellent distinction is insisted upon between assimilation proper, or the appropriation of carbon and its combination with hydrogen and oxygen, and assimilation as meant by animal physiologists. There is likely to arise confusion unless such a distinction is observed.

It is gratifying to find the subjects of geotropism, heliotropism, *et id omne genus*, cut off with the brevity that our ignorance concerning them demands, for an explanation that does not explain, only serves to mystify.

The subject of fertilization, however, hardly receives due attention, though other phases of the reproductive processes are well treated. It ought to be pointed out here that Strasburger, in a later work (Neue Untersuchungen, Oct., 1884), corrects his statement quoted on p. 435 as to the union of one of the synergidæ with the oösphere. (See BOT. GAZ. ix. 328.)

The illustrations in the second part do not compare favorably with those in the first. The figures of the structure of the pollen-grain and the embryo sac are much too small for clearness, and some of the figures of apparatus are quite coarse.

The practical exercises, which form a separately-paged appendix to the volume, will serve a good purpose in the laboratory work of the student. They contain many valuable hints as to material for study, and enumerate the more important physiological experiments that can be performed by a skillful manipulator in a well-equipped chemical and physical laboratory, including also a large number which require only a little skill and less apparatus.

The second volume of "Gray's Botanical Text-Book" is a worthy companion to the first one by Dr. Gray himself.

Report on the Flora of Western and Southern Texas. By Dr. V. Havard, U. S. A. From Proc. U. S. Nat. Museum. Sept. 23-30, 1885. pp. 85.

Since 1880 Dr. Havard has been stationed at several posts, and has also accompanied several exploring expeditions in Western Texas. His report is divided into two parts. Part I discusses the vegetation in the general way, under the following heads: general view; rainfall; temperature; valleys; valleys east of the Pecos (Concho, Colorado, Brazos, Red River); the Pecos; valleys west of the Pecos; the Rio Grande; hills, bluffs, and mesas; staked plains; prairies; coast; mountains; salt lakes basin. Part II is made up of economic notes on the plants known to have useful or baneful properties, or to be of value to agriculture or industry. Altogether, it is a careful and pains-taking report, and forms a valuable contribution to our knowledge of the botany of a very interesting region.

The Mycologic Flora of the Miami Valley, Ohio. By A. P. Morgan. From the Journal of the Cincinnati Soc. Nat. Hist. 1885.

There are before us three papers, a continuation of the Mycologic Flora of the Miami Valley, in which Mr. Morgan displays much hard work, and work that can hardly help giving an additional impetus to the study of western mycology. They comprise by far the larger part of Order II, Polyporei, of the Hymenomycetes, and have been delayed in their distribution until the completion of the bulky genus Polyporus. This genus, like the genus Agaricus of the Agaricini, includes most of the Order. A short paper will contain the remaining six genera.

The paper on Polyporus is the first attempt to give a systematic account of the species of any region of the United States. The Polypori, unlike the fleshy Agarici, are mainly leathery or woody plants, on which account they are easily preserved and have been liberally sent abroad by collectors. The native American species, therefore, have been chiefly named from the dried specimens, and the consequence is an extensive synonymy, which it will take a long time yet to clear up.

The species of Polyporus, in these papers, are presented in the arrangement of Fries, in the second edition of the *Epicrisis*, this answering almost as well for them as for the European species, and not in the arrangement of the *Novæ Symbolæ* of Fries, which would probably be necessary for a full account of the Polyporei of the United States.

Of the eighty-six species, thirty-four are not found in the Epicrisis, and are therefore practically inaccessible to the ordinary student. Fifty-two species, therefore, are identical with European forms, while thirty-four are native; of the latter, however, several are found in other lands. Seven of the species were first found in the Miami Valley, by Mr. Lea, and published in the Cincinnati Catalogue in 1849; and although Mr. Morgan's researches have doubled Mr. Lea's list, he has been able to add but three new species.

Mushrooms of America—Edible and Poisonous. By Julius A. Palmer, Jr. Prang & Co. Boston [1885]. Chart or Roy. 8°. pp. 4. 12 col. plates.

Although the author, in his first sentence, disavows having prepared the work for botanists, yet the several hundred botanists of this country will surely take as great an interest in it as the general public. It is an admirable and much needed work, intended to introduce the novice to a number of common edible mushrooms, and to warn him of some poisonous ones. It is lamentable that one can not gather mushrooms for the table indiscriminately, but as this can not be done, it is some consolation to learn that, although abundant in individuals, there are comparatively few really deadly species. Four of the most common of these are illustrated, together with six others which are to be avoided. The remainder of the work embraces a dozen and a half edible species. Almost everyone will recognize some old acquaintances among them, and regret that their value as food had not been known long since.

Although mushrooms are plants, they have the comestible qualities of flesh, and to some extent may replace this costly article of diet. The Société Mycologique, of France, devoted to diffusing a better knowledge of the value of mushrooms for food, has a few members in this country; but a work like the present is a strong additional agent for obtaining the same result. The certain recognition of the different kinds is essential to securing and maintaining popularity. All that word and picture can do toward this is here furnished. The plates are naturally and artistically colored with the skill which has brought Prang & Co. deserved fame, and the text is simple and accurate. Under each plate is a description of the species, in which it has only been necessary to use seven words requiring definition, no one of these having more than six letters. Following the description is the recipe for cooking.

The work is issued in three forms: as a chart for the wall, loose sheets in a portfolio, and bound in book form. It is to be hoped that it will meet with sufficient sale to warrant the publishers in continuing the work, as they express a willingness to finally illustrate most of the larger North American mushrooms.

Recherches Anatomiques sur les organes vegetatifs de l' Urtica dioica L. Par A. Gravis. 4 to. pp. X. 256. 23 plates. Bruxelles. 1885.

This is a most elaborate work, and the plates, as is usually the case in European monographs, are beyond all praise. The author has not only studied anatomically the species mentioned, but all its relatives, so that the labor involved a pretty thorough examination of the order. To give some idea of the care taken, the author states that over 15,000 sections of *Urtica dioica* alone were made, in view of which fact, who will soon dare to contradict the results? M. Gravis is strongly of the opinion that anatomical and embryological characters will furnish the same useful basis of classification among plants as it has already done among animals. His criticism of previous anatomical work among plants, however, is that certain regions of a certain age have been examined, to the entire neglect of other regions and other phases in development. Accordingly in the case of *Urtica dioica* the author treats of the stem, the leaf, and the root, and in each case has made an exhaustive study of the tissues from the first appearance of these organs to their completest development, no region being neglected. The tracing of the fibro vascular bundles into and through the nodal regions, and the working out of the leaf structures from the cotyledons on, are especially fine. The contribution is not only a pleasure and a help to those who like good work, but also a very good lesson to the many who seem to think they can learn all about the anatomy of a plant from a few sections.